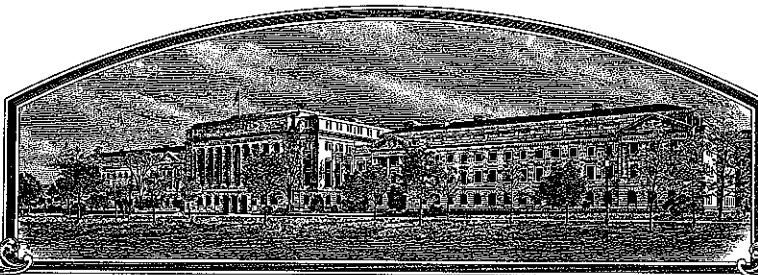


No.

200500242



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME;

Oklahoma Agricultural Experiment Station (OAES)

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Deliver'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fifth day of June, in the year two thousand and six.

Attest:


Commissioner
Plant Variety Protection Office
Agricultural Marketing Service


Secretary of Agriculture

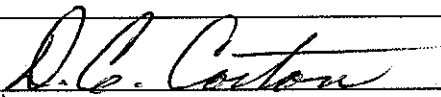


U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER Oklahoma Agricultural Experiment Station (OAES)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME OK98690		3. VARIETY NAME DELIVER	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) Oklahoma State University 139 Ag Hall Stillwater, OK 74078		5. TELEPHONE (include area code) (405) 744-5398		FOR OFFICIAL USE ONLY PVPO NUMBER 200500242 FILING DATE May 6, 2005	
		6. FAX (include area code) (405) 744-5269			
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Public University		8. IF INCORPORATED, GIVE STATE OF INCORPORATION		9. DATE OF INCORPORATION	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Dr. D.C. Coston - Assoc. Director-OAES Oklahoma State University 139 Ag Hall Stillwater, OK 74078 Dr. Robert I. Westerman Interim Associate Director - OAES				FILING AND EXAMINATION FEES: \$ 3652.00 DATE 5/06/2005 CERTIFICATION FEE: \$ 768.00 DATE 4/12/06	
11. TELEPHONE (include area code) (405) 744-5398		12. FAX (include area code) (405) 744-5269		13. E-MAIL dcoston@okstate.edu	
14. CROP KIND (Common Name) Hard Red Winter Wheat		16. FAMILY NAME (Botanical) Poaceae		18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.	
15. GENUS AND SPECIES NAME OF CROP Triticum aestivum		17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$3,652), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)				20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act) <input checked="" type="checkbox"/> YES (If "yes", answer items 21 and 22 below) <input type="checkbox"/> NO (If "no", go to item 23) 21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED 22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)				24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF OWNER 			SIGNATURE OF OWNER		
NAME (Please print or type) D.C. Coston			NAME (Please print or type)		
CAPACITY OR TITLE Assoc. Director-OAES		DATE 4/11/05		CAPACITY OR TITLE Assoc. Director-OAES	
				DATE	

INSTRUCTIONS

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GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable (*in the sense that it will reproduce an entire plant*) tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for \$3,652 (\$432 filing fee and \$3,220 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office

Telephone: (301) 504-5518

FAX: (301) 504-5291

Homepage: <http://www.ams.usda.gov/science/pvpo/pvpindex.htm>

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and provide evidence that name has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, 10301 Baltimore Avenue, Suite 401 NAL Building, Beltsville, MD 20705. Telephone: (301) 504-5682 <http://www.ams.usda.gov/lsg/seed.htm>.

ITEM

- 19a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
20. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

23. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

August 6, 2004 Foundation seed sold for increase purposes by the Oklahoma Foundation Seed Service

24. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

DELIVER-AN Awnletted HRWW FOR OKLAHOMA AND THE GREAT PLAINS

Origination and Breeding Procedure

Deliver was tested as OK98690. It is an F_3 -derived line that was selected from the single cross, OK91724/Karl. OK91724 was a high yielding advanced breeding line developed in the OSU breeding program with the pedigree Yantar/2*Chisholm. Yantar (PI 565327) is a Bulgarian cultivar in which researchers in China found adult-plant resistance to leaf rust based on a pair of complementary resistance genes (Yang et al., Euphytica 48:83-86, 1990). Yantar has the pedigree, Pervenka/Mironovskaja 808. We recommend the pedigree of Deliver be expressed as OK91724 (=Yantar/2*Chisholm)/Karl.

The single cross was performed in 1992 and the F_1 plant generation was grown in the greenhouse at Stillwater and harvested in bulk. The F_2 generation was also harvested in bulk. The F_3 population was evaluated for plant and head type, maturity, adult-plant resistance to leaf rust, and for seed quality. Single heads were harvested from the F_3 population. OK98690 traces to a single $F_{3:4}$ head row selected at Stillwater in 1996 on the basis of plant and head type, maturity, and seed quality. The head-row progeny was evaluated in 1997 in a non-replicated observation nursery for fall growth habit, resistance to leaf rust, barley yellow dwarf virus, and wheat soilborne mosaic virus, plant height, heading date and maturity, green leaf duration (stay-green), spike density, test weight, seed quality, and grain yield. From 1998 through 2003, OK98690 was evaluated in the following replicated yield trials, representing 49 site-years in Oklahoma:

Preliminary Yield Nursery (PYN)	1998
Advanced Wheat Performance Nursery (AWPN)	1999
Oklahoma Elite Nursery 2 (OET2)	2000-2003
Southern Regional Performance Nursery (SRPN)	2003
Wheat Variety Trials (WVT)	2003, 2004

Dr. Ed Smith was responsible for the cross, selection in the segregating generations, and testing to the preliminary yield nursery stage. Dr. Brett Carver directed all subsequent evaluation and testing of the advanced line. In addition to the local and regional performance nurseries listed above, Deliver was also tested in the 2000 and 2001 Regional Germplasm Observation Nurseries (RGON). Its end-use quality was externally examined in the 2003 Hard Winter Wheat Milling and Baking Evaluation Program sponsored by the Wheat Quality Council.

Deliver was officially released by the Oklahoma Agricultural Experiment Station and the USDA/ARS in 2004. It is a beardless, hard red winter wheat cultivar, *Triticum aestivum* L. Seed multiplication and distribution will be handled by the Oklahoma Foundation Seed Service, Inc.

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Addendum to Exhibit A

Deliver has been observed to be uniform and stable for two generations over a 2-yr period from 2004 to 2005. No phenotypically distinguishable variants were observed during the period of breeder-seed multiplication.

Revised Exhibit B - Statement of Distinctness***Most Similar Varieties***

Deliver most closely resembles the HRW wheat cultivars, Chisholm and Karl. Chisholm is essentially a grandparent but constitutes 38% of the parentage of Deliver, whereas Karl constitutes 50% of Deliver's parentage. Deliver resembles Karl in straw strength, acid-soil tolerance, kernel texture, and dough strength based on mixing tolerance. It resembles Chisholm in juvenile plant growth and test weight, but its plant color is blue-green (see Ex. C.5) whereas Chisholm's plant color is green. Distinctness of Deliver versus Chisholm and Karl may be drawn in three key areas: 1) head awnedness, 2) genotype for leaf rust resistance, and 3) phenotype for wheat soilborne-mosaic virus resistance (Chisholm only).

Supportive Data to Declare Distinctness**1. Head awnedness**

Deliver is apically awnleted, with typically 1 to 2 awns extending no more than 1.5 cm from the glume. In some environments, no awns are detectable.

Chisholm and Karl produce fully awned spikes representative of hard red winter wheat cultivars.

2. Disease resistance

Deliver carries the *Lr26* seedling resistance gene for leaf rust (USDA-ARS Cereal Rust Disease Laboratory, St. Paul, MN), in addition to other unknown genes expressed in the adult plant.

Chisholm carries no known seedling or adult-plant resistance genes for leaf rust, whereas Karl carries *Lr1*, *Lr3ka*, and *Lr10*.

3. Reaction to wheat soilborne-mosaic virus

Deliver has a gene(s) (yet unnamed) for resistance to wheat soilborne-mosaic virus (WSBMV), whereas Chisholm does not. Symptoms of WSBMV may be expressed on a qualitative scale of 1 (resistant) to 4 (highly susceptible), in which Chisholm typically receives a rating of 4 and Deliver receives a rating of 1 in Oklahoma. Symptoms that appear on Chisholm, which do not appear on Deliver, are prominent yellow leaf mosaics during the late February to early March jointing period, and subsequent stunting of plants and reduced spike production.

Rather than use the visual rating scale to distinguish two varieties (which would involve a statistical comparison based on a qualitative scale with virtually no error variance), our case for distinctness can be made on the correlated trait, grain yield. Because the visual differences in symptom expression are so profound between Deliver and Chisholm, resulting

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grain yields are often easily differentiated in environments prone to WSBMV infection. Grain yields are statistically compared in Table 1 (see attachment, "deliver pvp revision Ex B data.xls") in three Oklahoma field environments where genotypic differences in yield were primarily determined by genetic resistance to WSBMV.

The paired comparisons reveal a consistent, significant difference ($P < 0.05$) in each year for grain yield following severe WSBMV infection. Grain yield averaged 100% greater for Deliver compared with Chisholm. This resistance trait, combined with the novel apically awnleted spike trait in a hard red winter wheat background, served as primary motivation behind Deliver's release.

Table 1. Grain yield in bu/ac in the presence of severe WSBMV for three site-years in Oklahoma.

	2003 Marshall, OK	2003 Lahoma, OK	2005 Lahoma, OK
Deliver			
Mean	65.4	80.7	52.3
Min	57.5	79.0	48.2
Max	70.0	82.7	57.5
Chisholm			
Mean	27.0	46.7	28.2
Min	22.5	41.0	28.0
Max	31.7	54.9	28.5
LSD (0.05)	6.8	7.6	5.9
% difference	142	73	85
Sowing date	10/16/2002	10/7/2002	10/4/2004
Harvest date	6/16/2003	6/18/2003	6/20/2005

Three paired observations per site-year

LSD determined from complete nursery containing 20 entries in 2003, 50 entries in 2005

Error term for LSD derived from replicate x genotype interaction variance

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**U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705**

Exhibit C

**OBJECTIVE DESCRIPTION OF VARIETY
Wheat (*Triticum* spp.)**

NAME OF APPLICANT (S) Oklahoma Agricultural Experiment Station	TEMPORARY OR EXPERIMENTAL DESIGNATION OK98690	VARIETY NAME DELIVER
ADDRESS (Street and No. or RD No., City, State, Zip Code and Country) Oklahoma State University 139 Ag Hall Stillwater, OK 74078 Attn: D.C. Coston		FOR OFFICIAL USE ONLY PVPO NUMBER 200500242

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g., or) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: _____ Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

1 = Common
2 = Durum
3 = Club
4 = Other (Specify) _____

2. VERNALIZATION:

1 = Spring
2 = Winter
3 = Other (Specify) _____

3. COLEOPTILE ANTHOCYANIN:

1 = Absent 2 = Present

4. JUVENILE PLANT GROWTH:

1 = Prostrate 2 = Semi-erect 3 = Erect

5. PLANT COLOR: (boot stage)

1 = Yellow-Green
2 = Green
3 = Blue-Green

6. FLAG LEAF: (boot stage)

1 = Erect 2 = Recurved
 1 = Not Twisted 2 = Twisted
 1 = Wax Absent 2 = Wax Present

7. EAR EMERGENCE:

Number of Days (Average)
 Number of Days Earlier Than * Scout 66
Same As * 2174, 2137, and Ok102
 Number of Days Later Than * Ok101 and Jagger
*Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

8. ANTHR COLOR:

1 = Yellow 2 = Purple

9. PLANT HEIGHT: (from soil to top of head, excluding awns)

0 8 5

cm (Average)

0 2

cm Taller Than Ok101

Same As

2174

0 1

cm Shorter Than 2137

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10. STEM:

A. ANTHOCYANIN

1

1 = Absent 2 = Present

B. WAXY BLOOM

2

1 = Absent 2 = Present

C. HAIRINESS (last internode of rachis)

1

1 = Absent 2 = Present

D. INTERNODE

1

1 = Hollow 2 = Semi-solid 3 = Solid

5

Number of Nodes

E. PEDUNCLE

1

1 = Erect 2 = Recurved 3 = Semi-erect

3 8

cm Length

F. AURICLE

1

Anthocyanin: 1 = Absent 2 = Present

1

Hair: 1 = Absent 2 = Present

11. HEAD: (At Maturity)

A. DENSITY

3

1 = Lax
2 = Middense (Laxidense)
3 = Dense

B. SHAPE

1

1 = Tapering
2 = Strap
3 = Clavate
4 = Other (Specify) _____

C. CURVATURE

3

1 = Erect
2 = Inclined
3 = Recurved

D. AWNEDNESS

2

1 = Awnless
2 = Apically Awnletted
3 = Awnletted
4 = Awned

12. GLUMES: (At Maturity)

A. COLOR

1

1 = White
2 = Tan
3 = Other (Specify) _____

B. SHOULDER

4

1 = Wanting 2 = Oblique
3 = Rounded 4 = Square
5 = Elevated 6 = Apiculate
7 = Other (Specify) _____

E. BEAK WIDTH

2

1 = Narrow
2 = Medium
3 = Wide

F. GLUME LENGTH

3

1 = Short (ca. 7mm)
2 = Medium (ca. 8mm)
3 = Long (ca. 9mm)

C. SHOULDER WIDTH

3

1 = Narrow
2 = Medium
3 = Wide

G. WIDTH

3

1 = Narrow (ca. 3mm)
2 = Medium (ca. 3.5mm)
3 = Long (ca. 4mm)

D. BEAK

1

1 = Obtuse
2 = Acute
3 = Acuminate

13. SEED:

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A. SHAPE

- ☐ 1 = 1 = Ovate
☐ 2 = 2 = Oval
☐ 3 = 3 = Elliptical

B. CHEEK

- ☐ 1 = 1 = Rounded
☐ 2 = 2 = Angular

C. BRUSH

- ☐ 2 = 1 = Short
☐ 2 = 2 = Medium
☐ 3 = 3 = Long
☐ 1 = 1 = Not Collared
☐ 2 = 2 = Collared

D. CREASE

- ☐ 1 = 1 = Width 60% or less of Kernel
☐ 2 = 2 = Width 80% or less of Kernel
☐ 3 = 3 = Width Nearly as Wide as Kernel

- ☐ 1 = 1 = Depth 20% or less of Kernel
☐ 2 = 2 = Depth 35% or less of Kernel
☐ 3 = 3 = Depth 50% or less of Kernel

E. COLOR

- ☐ 3 = 1 = White
☐ 2 = 2 = Amber
☐ 3 = 3 = Red
☐ 4 = 4 = Other (Specify) _____

F. TEXTURE

- ☐ 1 = 1 = Hard
☐ 2 = 2 = Soft
☐ 3 = 3 = Other (Specify) _____

G. PHENOL REACTION (See Instructions)

- ☐ 0 = 1 = Ivory
☐ 2 = 2 = Fawn
☐ 3 = 3 = Light Brown
☐ 4 = 4 = Dark Brown
☐ 5 = 5 = Black

H. SEED WEIGHT

- ☐ 3 ☐ 2 = g/1000 Seed (Whole number only)

I. GERM SIZE

- ☐ 1 = 1 = Small
☐ 2 = 2 = Midsize
☐ 3 = 3 = Large

14. DISEASE: PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

(0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

- | | |
|---|---|
| <input type="checkbox"/> 1 Stem Rust (<i>Puccinia graminis</i> f. sp. <i>tritici</i>) | <input type="checkbox"/> 1 Leaf Rust (<i>Puccinia recondita</i> f. sp. <i>tritici</i>) |
| <input type="checkbox"/> 2 Stripe Rust (<i>Puccinia striiformis</i>) | <input type="checkbox"/> 0 Loose Smut (<i>Ustilago tritici</i>) |
| <input type="checkbox"/> 1 Tan Spot (<i>Pyrenophora tritici-repentis</i>) | <input type="checkbox"/> 0 Flag Smut (<i>Urocystis agropyri</i>) |
| <input type="checkbox"/> 0 Halo Spot (<i>Selenophoma donacis</i>) | <input type="checkbox"/> 0 Common Bunt (<i>Tilletia tritici</i> or <i>T. laevis</i>) |
| <input type="checkbox"/> 0 <i>Septoria nodorum</i> (Glume Blotch) | <input type="checkbox"/> 0 Dwarf Bunt (<i>Tilletia controversa</i>) |
| <input type="checkbox"/> 0 <i>Septoria avenae</i> (Speckled Leaf Disease) | <input type="checkbox"/> 1 Karnal Bunt (<i>Tilletia indica</i>) |
| <input type="checkbox"/> 3 <i>Septoria tritici</i> (Speckled Leaf Blotch) | <input type="checkbox"/> 1 Powdery Mildew (<i>Erysiphe graminis</i> f. sp. <i>tritici</i>) |
| <input type="checkbox"/> 3 Scab (<i>Fusarium</i> spp.) | <input type="checkbox"/> 0 "Snow Molds" |
| <input type="checkbox"/> 0 "Black Point" (Kernel Smudge) | <input type="checkbox"/> 0 Common Root Rot (<i>Fusarium</i> , <i>Cochliobolus</i> and <i>Bipolaris</i> spp.) |
| <input type="checkbox"/> 1 Barley Yellow Dwarf Virus (BYDV) | <input type="checkbox"/> 0 Rhizoctonia Root Rot (<i>Rhizoctonia solani</i>) |
| <input type="checkbox"/> 2 Soilborne Mosaic Virus (SBMV) | <input type="checkbox"/> 2 Black Chaff (<i>Xanthomonas campestris</i> pv. <i>translucens</i>) |
| <input type="checkbox"/> 2 Wheat Yellow (Spindle Streak) Mosaic Virus | <input type="checkbox"/> 0 Bacterial Leaf Blight (<i>Pseudomonas syringae</i> pv. <i>syringae</i>) |
| <input type="checkbox"/> 1 Wheat Streak Mosaic Virus (WSMV) | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |

15. INSECT: (0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

- | | |
|--|--|
| <input type="checkbox"/> 1 Hessian Fly (<i>Mayetiola destructor</i>) | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> 1 Stem Sawfly (<i>Cephus</i> spp.) | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> 0 Cereal Leaf Beetle (<i>Oulema melanopa</i>) | <input type="checkbox"/> Other (Specify) _____ |

15. INSECT: (continued) 0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant

PLEASE SPECIFY BIOTYPE (Where Needed)

<input checked="" type="checkbox"/> 1	Russian Aphid (<i>Diuraphis noxia</i>)	<input type="checkbox"/>	Other (Specify) _____
<input checked="" type="checkbox"/> 1	Greenbug (<i>Schizaphis graminum</i>)	<input type="checkbox"/>	Other (Specify) _____
<input checked="" type="checkbox"/> 1	Aphids	<input type="checkbox"/>	Other (Specify) _____

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS:

#7 EAR EMERGENCE: Number of Days = Days after March 31



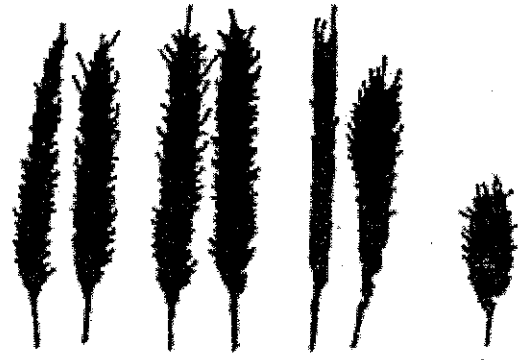

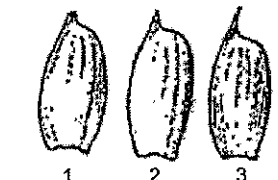
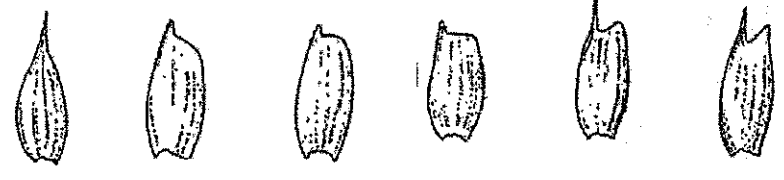
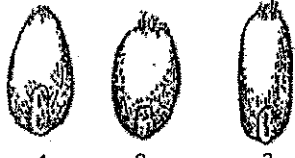

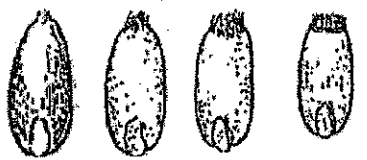
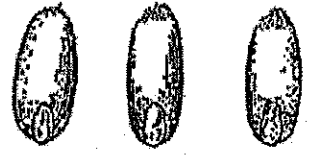



#13G Phenol Reaction = Unknown

<1% Awned and Awnletted Plants

WHEAT DESCRIPTOR ILLUSTRATIONS

200500242

Section Numbers Correspond to the Numbers of the Sections on the Form

<p>4. EARLY PLANT GROWTH HABIT:</p>  <p>1 Prostrate 2 Intermediate 3 Erect</p>	<p>10. STEM INTERNODE X-SECTION:</p>  <p>1 Hollow 2 Semi-solid 3 Solid</p>	<p>11. SPIKE SHAPE:</p>  <p>1 Tapering 2 Oblong 3 Clavate 4 Elliptical</p>	
<p>11. AWNEDNESS:</p>  <p>1 Awnless 2 Apically Awnleted 3 Awnleted 4 Awned</p>	<p>12. BEAK SHAPE:</p>  <p>1 Obtuse 2 Acute 3 Acuminate</p>		
<p>12. SHOULDER SHAPE:</p>  <p>1 Wanting 2 Oblique 3 Rounded 4 Square 5 Elevated 6 Apiculate</p>			
<p>13. SEED SHAPE:</p>  <p>1 Ovate 2 Oval 3 Elliptical</p>	<p>13. CHEEK SHAPE:</p>  <p>1 Rounded 2 Angular</p>	<p>13. BRUSH SIZE:</p>  <p>1 Small 2 Midsized 3 Large 4 Collared</p>	<p>13. BRUSH HAIR LENGTH:</p>  <p>1 Short 2 Medium 3 Long</p>
<p>13. GERM (EMBRYO) SIZE:</p>  <p>1 Small 2 Midsized 3 Large</p>	<p>13. SEED CREASE WIDTH:</p>  <p>1 Narrow 2 Mid-wide 3 Wide</p>	<p>13. SEED CREASE DEPTH:</p>  <p>1 Shallow 2 Mid-Deep 3 Deep</p>	

12

Quality assessment

The large-kernel fraction of Deliver is considered very high (76% across 22 OK environments), which is significantly higher than 2137, Jagger, Ok101, and Ok102. Over a four-year period, the TKW averaged 31.5 g, compared with 28.8 g for Ok102 and 29.6 for Ok101. In most comparisons since 2001, Deliver has shown larger SKCS-TKW than 2137, Jagger, 2174, Ok101, and Ok102. Mean kernel diameter of Deliver was 2.36 mm across 27 environments, well above the target of 2.2 mm for hard red winter wheat. Deliver possesses physical grain attributes that will appeal to millers who place a premium on consistent and large kernel size.

Deliver lacks consistency for kernel hardness. Its mean SKCS-hardness varied from 70 in 2000 to 44 in 2003, with a mean of 57 across 27 environments. The NIR hardness index averaged about the same at 56 in 22 environments. The hardness patterns of Deliver reflect those of one of its parents, Chisholm, which has a reputation of low hardness, but good milling and baking performance. The hardness data alone may place Deliver in a marginal category for hard winter wheat, but as subsequent data demonstrate, its end-use quality performance is exceptional and visual classification by USDA-GIPSA confirms its HRW status.

Protein content of Deliver ranged from 11.5 to 12.7% over a 4-year period, and averaged 12% across 27 environments, which is about 1% greater than Ok101 (11.2%) and about 0.5% less than Ok102 (12.5%). Wheat-to-flour protein loss is 1.2%, close to the expected value of 1.5% for hard winter wheat.

Based on laboratory-scale milling, Deliver has outstanding flour yield (Brabender Quadrumat Senior mill) with a mean of 64.4%. It performs equivalent to the high flour-yield check, Ok101, and in most years is superior to 2137, Jagger, and 2174. The combination of exceptional seed size characteristics, excellent test weight patterns, and relatively high flour extraction should place Deliver in a premium category for milling quality. The quality profile generated by ConAgra in 2002 for a seven-location grain composite indicates Deliver provides a milling extraction of 75.2%, equivalent to the high-yield check, Ok101 (75.0%), and at a lower flour ash content (0.40%) than Ok 101(0.47%). Straight-grade flour yield of 70% (Buhler) at 0.45% flour ash are considered reasonable targets. The exceptional combination of flour extraction-flour ash observed in Deliver indicates this cultivar may provide good product color and shelf life.

Deliver has a relatively long mixing time, 7 min across 27 environments, which is two minutes longer than Ok101 and 2174, and characteristic of one of its parents, Karl. Its dough strength is also characteristic of Karl, as demonstrated by above-average mixogram ratings (mean of 4.8 on a 1-10 scale) and mixogram curve width at 2 min past the peak (mean of 12.8 mm). Only Ok102 has shown occasional superiority in mixing tolerance. In summary, the dough strength of Deliver is an improvement over Ok101 and 2174, but does not surpass Ok102. These findings have been validated by ConAgra.

Actual baking performance of Deliver was assessed internally by OSU's Wheat Quality Laboratory and externally by ConAgra, Inc. Deliver was given acceptable baking scores in 2002 and 2003, averaging 58.8 on a 1-to-65 scale. In comparison, average baking score for Ok102, a high-quality check, was 60.8. Bake absorption averaged 63.2% for Deliver and 63.7% for Ok102, whereas loaf volume averaged 839 cc for Deliver and 866 cc for Ok102. These results indicate Deliver should be a highly suitable candidate for commercial, large-scale baking operations. The Wheat Quality Council scored overall baking quality of Deliver as above-average relative to all breeder samples submitted in 2003, and not significantly different from the superior check, Ok102. In summary, Deliver has above average milling and baking characteristics, with particular strengths in flour yield, mixing tolerance, and loaf volume.

Other Descriptive Information

1. Adaptation

In the 2003 Southern Regional Performance Nursery, Deliver ranked eighth in yield performance (4647 kg ha^{-1} versus the nursery mean of 4389 kg ha^{-1}) across the entire region, indicating broad adaptation throughout the Great Plains. Its primary zone of adaptation lies in the central corridor of the southern Plains, from north central Oklahoma into south central Kansas.

2. Agronomic traits

Deliver maintains a semi-erect to erect growth habit throughout the vegetative period, and its canopy texture may be described as moderately coarse. Deliver is a semidwarf wheat with intermediate plant stature that is similar to 2174 in Oklahoma (85 cm) and about 2 cm taller than Ok101. Deliver heads at the same time as 2174, but 3 days later than Ok101 and Jagger. Deliver is moderately susceptible to aluminum toxicity and does not possess the 'Atlas 66' allele at the *ALMT1* locus on chromosome 4DL that confers aluminum tolerance in nutrient-solution culture. Deliver is moderately susceptible to lodging and similar to Jagger in straw strength

3. Disease and insect resistance

<u>Disease</u>	<u>Reaction</u>
Leaf rust (adult-plant)	Moderately resistant
Leaf rust (seedling)	Susceptible
Stripe rust (adult plant)	Moderately resistant
Stem rust (adult plant)	Moderately to very susceptible
Wheat soilborne mosaic	Resistant
Wheat spindle streak mosaic	Resistant
Barley yellow dwarf virus	Susceptible
Septoria complex (leaf reaction)	Moderately resistant
Tan spot	Moderately resistant
Powdery mildew	Susceptible
Fusarium head blight	Intermediate

<u>Insect</u>	<u>Reaction</u>
Greenbug (all biotypes)	Susceptible
Russian wheat aphid (Biotypes I, II)	Susceptible
Hessian fly	Moderately susceptible

3. Grain quality

Contrary to the expectations for an awnletted wheat, Deliver has outstanding test weight patterns, averaging 2.1 lb/bu higher than Jagger, 1.2 lb/bu higher than Ok101, and equal in test weight to Ok102. Thousand-kernel weight has averaged 31.5 g, compared with 29.6 g

for Ok101. Mean kernel diameter of Deliver has averaged 2.36 mm across 27 Oklahoma environments. Deliver possesses physical grain attributes that will appeal to millers who place a premium on consistent and large kernel size.

Kernel hardness patterns of Deliver (mean kernel hardness index of 57) reflect those of one of its parents, Chisholm, which has a reputation of low hardness, but good milling and baking performance. Protein content of Deliver ranged from 11.5 to 12.7% over a 4-year period in Oklahoma, and averaged 12% across 27 environments.

Deliver has a relatively long mixing time, averaging 7 min across 27 Oklahoma environments, that is characteristic of one of its parents, Karl. Its dough strength is also characteristic of Karl, as demonstrated by above-average mixogram ratings (mean of 4.8 on a 1-10 scale) and mixogram curve width at 2 min past the peak (mean of 12.8 mm).

4. Summary

Deliver has the attributes of a successful cultivar of hard red winter wheat: i) moderate to substantial improvement in grain yield potential over currently grown cultivars, ii) outstanding test weight patterns combined with unusually large kernel size, iii) consistently high forage availability throughout the winter grazing season combined with good winter-dormancy retention, iv) reasonably good resistance to the major foliar diseases in Oklahoma, including a relatively high level of resistance to septoria and tan spot, and v) above-average milling and baking quality. Even more unique is that these attributes exist in an awnletted genotype that can be equally recommended for a dual-purpose system, a grain-only system, or a hay-production/graze-out system. This range of adaptation gives producers flexibility in their management options that they currently lack with awned grain-type cultivars or awnletted forage-type cultivars.

5. Cooperating Scientists

The contributions of Ed Smith, retired OSU wheat breeder, were central to the development of OK98690. Its identification as a candidate cultivar was accomplished through OSU's Wheat Improvement Team, which includes Brett Carver (lead scientist), Jeff Edwards, Bob Hunger, Art Klatt, Jeanmarie Verchot-Lubicz, Patricia Rayas-Duarte, Arron Guenzi, Bjorn Martin, and David Porter. Also cooperating in the testing of Deliver were breeders and cereal chemists throughout the Great Plains.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

1. NAME OF APPLICANT(S) Oklahoma Agricultural Experiment Station (OAES)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER OK98690	3. VARIETY NAME DELIVER
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) Oklahoma State University 139 Ag Hall Stillwater, OK 74078	5. TELEPHONE (Include area code) (405) 744-5398	6. FAX (Include area code) (405) 744-5269
7. PVPO NUMBER 200500242		

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain. ☒ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? If no, give name of country. ☒ YES ☐ NO

10. Is the applicant the original owner? ☒ YES ☐ NO If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☐ YES ☐ NO If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☐ YES ☐ NO If no, give name of country

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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